

WHAT IS CLAIMED IS:

1. An environmental noise level estimation apparatus comprising:
5 detection means for detecting a level of a sound signal including a voice signal and an environmental noise signal;
 sampling means for repeatedly sampling said level in response to a clock signal;
10 variation detection means, having first storing means, responsive to said clock signal, for detecting whether said presently sampled level increases from said previously sampled level; and
 estimation means, having second storing means,
15 responsive to said clock signal, for estimating, renewing, and outputting an environmental noise level of said environmental noise signal such that, when said presently sampled level increases from said previously sampled level, difference between said presently estimated environmental
20 noise level and said previously estimated environmental noise level is lower than a predetermined value to gradually vary said estimated environmental noise level from said previously estimated environmental noise level.
25 2. An environmental noise level estimation apparatus as

claimed in claim 1, wherein said variation detection means further detects whether said presently sampled level decreases from said previously sampled level, when said presently sampled level decreases, said estimation means

5 estimates said environmental noise level such that said presently estimated environmental noise level corresponds to said presently sampled value to immediately decrease said presently estimated environmental noise level.

10 3. An environmental noise level estimation apparatus as claimed in claim 1, wherein said detection means comprises power level detection means for detecting a power of said sound signal and outputs said detected power as said level.

15 4. An environmental noise level estimation apparatus as claimed in claim 1, further comprising comparing means for comparing said detected level with a predetermined value, wherein said estimation means estimates said environmental noise level only when said detected level is smaller than

20 said predetermined value.

5. An environmental noise level estimation apparatus as claimed in claim 1, wherein an interval of said clock signal is smaller than 250 msec.

6. An environmental noise level estimation apparatus as claimed in claim 5, wherein an interval of said clock signal is smaller than 200 msec.

5 7. An environmental noise level estimation apparatus as claimed in claim 6, wherein an interval of said clock signal is smaller than 150 msec.

10 8. An environmental noise level estimation apparatus as claimed in claim 1, further comprises voice presence detection means for detecting the presence of voice signal in accordance with an output of said detection means, wherein said environmental noise level detection means stops said estimation means while said voice presence detection means detects the presence of voice signal.

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9. An environmental noise level estimation apparatus comprising:

20 detection means for detecting a level of a sound signal including a voice signal and an environment noise signal;

25 sampling means for repeatedly sampling said level at a first interval;

 variation detection means, having first storing means, responsive to said sampling means, for detecting

whether said presently sampled level increases from said previously sampled level; and

estimation means, having second storing means, for estimating and renewing an environmental noise level of 5 said voice signal to output said environmental noise level at a second interval such that, when said presently sampled level increases from said previously sampled level, difference between said presently estimated environmental 10 noise level and said previously estimated environmental noise level is lower than a predetermined value to gradually vary said estimated environmental noise level from said previously estimated environmental noise level, wherein said first interval agrees with said second interval.

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16. A communication apparatus comprising:

a microphone for receiving sound and generating a sound signal including a voice signal and an environmental noise signal;

20 communication means for transmitting said voice signal in a radio wave signal and receiving another voice signal;

reproducing means for reproducing said voice signal in accordance with said another voice signal;

25 detection means for detecting a level of said voice

signal;

sampling means for repeatedly sampling said level in response to a clock signal;

variation detection means, having first storing means, for detecting whether said presently sampled level increases from said previously sampled level; and estimation means, having second storing means, responsive to said clock signal, for estimating and renewing an environmental noise level of said voice signal such that, when said presently sampled level increases from said previously sampled level, difference between said presently estimated environmental noise level and said previously estimated environmental noise level is lower than a predetermined value to gradually vary said estimated environmental noise level from said previously estimated environmental noise level; and

volume control means for controlling a volume of said reproduced voice signal in accordance with said estimated environmental noise level.

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11. A communication apparatus as claimed in claim 10, further comprising a codec means for coding voice signal at a predetermined interval to supply said coded voice signal to said communication means as said voice signal and decoding means for decoding said another voice signal at

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said predetermined interval to supply said decoded another voice signal to said reproducing means as said voice signal, wherein said predetermined interval corresponds to an interval of said clock signal.

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12. A communication apparatus as claimed in claim 11, wherein said interval is 10 msec to 40 msec.

13. A communication apparatus as claimed in claim 12, 10 wherein said interval is 15 msec to 25 msec.

14. A communication apparatus as claimed in claim 13, wherein said interval is 20 msec.

15. A data terminal apparatus comprising:

sound source means for supplying sound data; reproducing means for reproducing reproduced sound in accordance with said sound data;

20 a microphone for receiving sound including at least an environmental noise and generating a sound signal;

detection means for detecting a level of said sound signal;

sampling means for repeatedly sampling said level in response to a clock signal;

25 variation detection means, having first storing

means, for detecting whether said presently sampled level increases from said previously sampled level; and estimation means, having second storing means, responsive to said clock signal, for estimating and

5 renewing an environmental noise level of said voice signal such that, when said presently sampled level increases from said previously sampled level, difference between said presently estimated environmental noise level and said previously estimated environmental noise level is lower

10 than a predetermined value to gradually vary said estimated environmental noise level from said previously estimated environmental noise level; and

15 volume control means for controlling a volume of said reproduced voice signal in accordance with said estimated environmental noise level.

16. A method of estimating an environmental noise level comprising the steps of:

detecting a level of a sound signal including a

20 voice signal and an environmental noise signal;

repeatedly sampling said level in response to a clock signal;

detecting whether said presently sampled level increases from said previously sampled level;

25 estimating and renewing an environmental noise level

of said voice signal in response to said clock signal to output said environmental noise level such that, when said presently sampled level increases from said previously sampled level, difference between said presently estimated 5 environmental noise level and said previously estimated environmental noise level is lower than a predetermined value to gradually vary said estimated environmental noise level from said previously estimated environmental noise level.

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17. A method as claimed in claim 16, wherein said step of detection further detects whether said presently sampled level decreases from said previously sampled level, when said presently sampled level decreases, said environmental 15 noise level is estimated such that said presently estimated environmental noise level corresponds to said presently sampled value to immediately decrease said presently estimated environmental noise level.

20 18. A method as claimed in claim 17, wherein said step of detecting said level of said sound signal comprises the step of detecting a power of said sound signal and outputs said detected power as said level.

25 19. A method as claimed in claim 17, further comprising

the step of:

comparing said detected level with a predetermined value, wherein said environmental noise level is estimated when said detected level is smaller than said predetermined
5 value.

20. A method as claimed in claim 17, wherein an interval of said clock signal is smaller than 250 msec.

10 21. A method as claimed in claim 20, wherein an interval of said clock signal is smaller than 200 msec.

22. A method as claimed in claim 21, wherein an interval of said clock signal is smaller than 150 msec.

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